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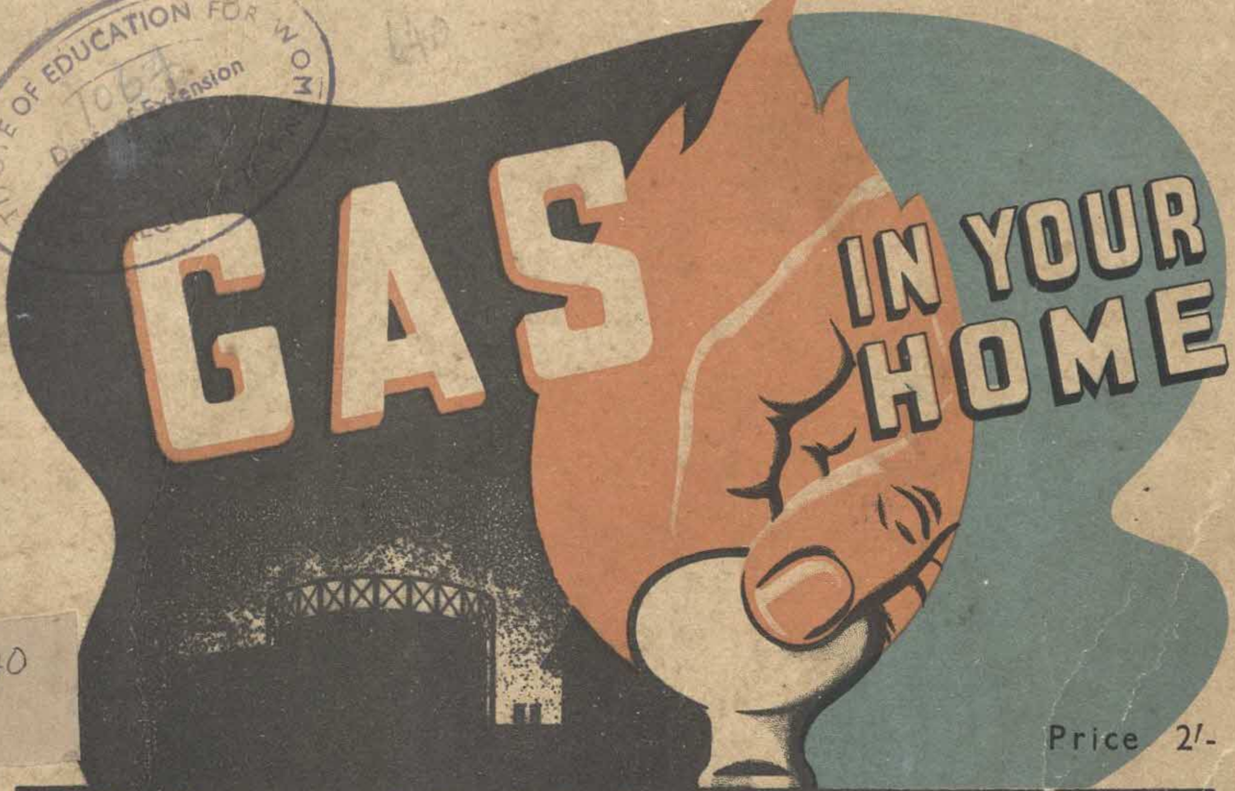

GAS IN YOUR HOME

Price 2/-

"CARE OF YOUR HOUSE SERIES
N° 3

INSTITUTE OF EDUCATION FOR WOMEN ★ CALCUTTA-27 ★
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FOREWORD

AT THE PRESENT TIME gas is used for cooking or other purposes in most of the homes in this country. Gas appliances have done much to increase comfort and to make the home simple to run and easy to keep clean. So efficient and trouble-free are they that people are apt to take them for granted. But all appliances give better service for a little attention, and consumers should know how to use their gas appliances properly and how to get the utmost value from their gas supply.

THIS BOOKLET contains much practical information on the functions and working of domestic appliances burning gas, or the Gas Industry's second smokeless fuel, coke. It gives readers an interesting insight into the operation of the various appliances and shows graphically and in an easily-understood way, the small amount of attention that is needed to keep each appliance working efficiently.

Under the Heating Appliances (Fire Guards) Act of 1952 which came into force on the 1st October 1954, it is an offence for any domestic gas or electric fire or oil heater, manufactured after 1st October 1954, to be sold or hired without a guard made in accordance with the prescribed safety regulations.

THE GAS INDUSTRY

Some interesting facts and figures

PRODUCTION.—The Gas Industry employs directly 145,000 people; while a further 120,000 are employed by the makers of plant and equipment. It uses yearly about 27 million tons of coal and 124 million gallons of oil for the production of:

500,000 million cu. ft. of gas. 1½ million tons of tar.

13½ million tons of coke. 16 million gallons of crude benzole.

83,000 tons of sulphate of ammonia.

HOME.—Gas is installed in nearly 12 million British homes. That means over 40 million people, or about five-sixths of the population, enjoy the services of gas. Since 1938, the domestic consumption of gas has increased by about 45 per cent.

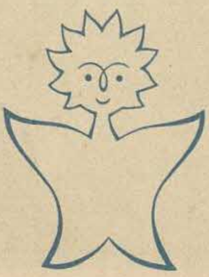
INDUSTRY.—Gas is used in some 4,000 industries and trades including engineering, steel, metals, electrical equipment, pottery, glass, food, textiles and clothing. The industrial demand for gas since 1938 has more than doubled.

COMMERCE.—Large-scale cooking, central heating and constant hot water are provided by gas in many hospitals, hotels, restaurants, factories, offices and public buildings.

Four million tons of coke are used every year for heating purposes in flats, hotels, offices, shops and other buildings.

COAL CARBONIZATION.—Of the total yearly output of coal in Great Britain, the Gas Industry and the Coke-Oven Industry carbonize over 25 per cent., or some 53 million tons.

COAL PRODUCTS RECOVERY.—Coal carbonization results in the recovery—in addition to gas and coke—of tar, benzole and ammonia which, in turn, are the source of a host of other valuable materials. From tar alone, chemical skill has extracted some 2,000 products and the list is not closed yet. Articles in everyday use such as aspirin, plastics, dyes, synthetic perfumes and photographic materials are derived from the products of gas-making.



SMOKE ABATEMENT.—The damage done by domestic smoke is estimated to cost the country £50 million a year. The use of gas and coke—both smokeless fuels—in millions of homes helps towards smoke abatement.

RESEARCH.—The Gas Industry spends annually about £1 million on research, testing and development and the search for natural gas, designed to improve the methods of coal carbonization, to increase the efficiency of gas-using appliances and to find new ways of utilizing gas and its products.

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CHAPTER 1 · YOUR GAS SUPPLY

Do you know

The gas in your home is one of the products of COAL and it provides an ever-ready source of light and heat.

When you burn coal in an ordinary open coal grate—

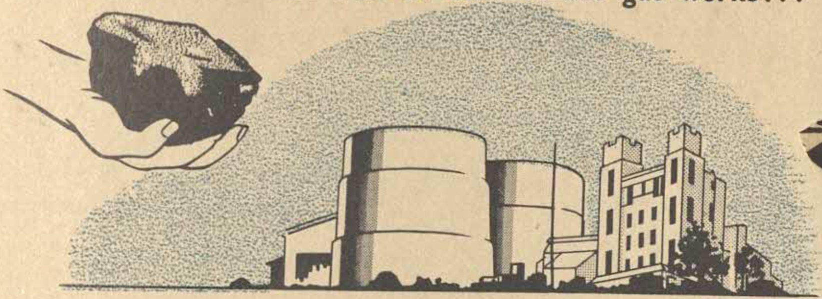
- Four-fifths of it is wasted.
- Valuable products go up the chimney in smoke and fumes.
- Soot and grime thus produced pollute the atmosphere, causing ill-health, extra cleaning, and deterioration of buildings.

1 lb. of COAL...

burned in an ordinary open grate

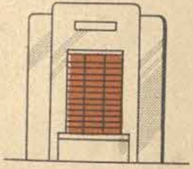
yields about 2,600 units of heat.

BUT 1 lb. of COAL in the gas works...



yields

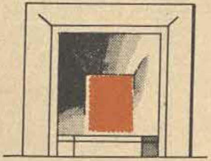
in the convector type of gas fire



2,000 useful heat units

TOTAL
4500
USEFUL HEAT
UNITS

in the convector type of coke fire



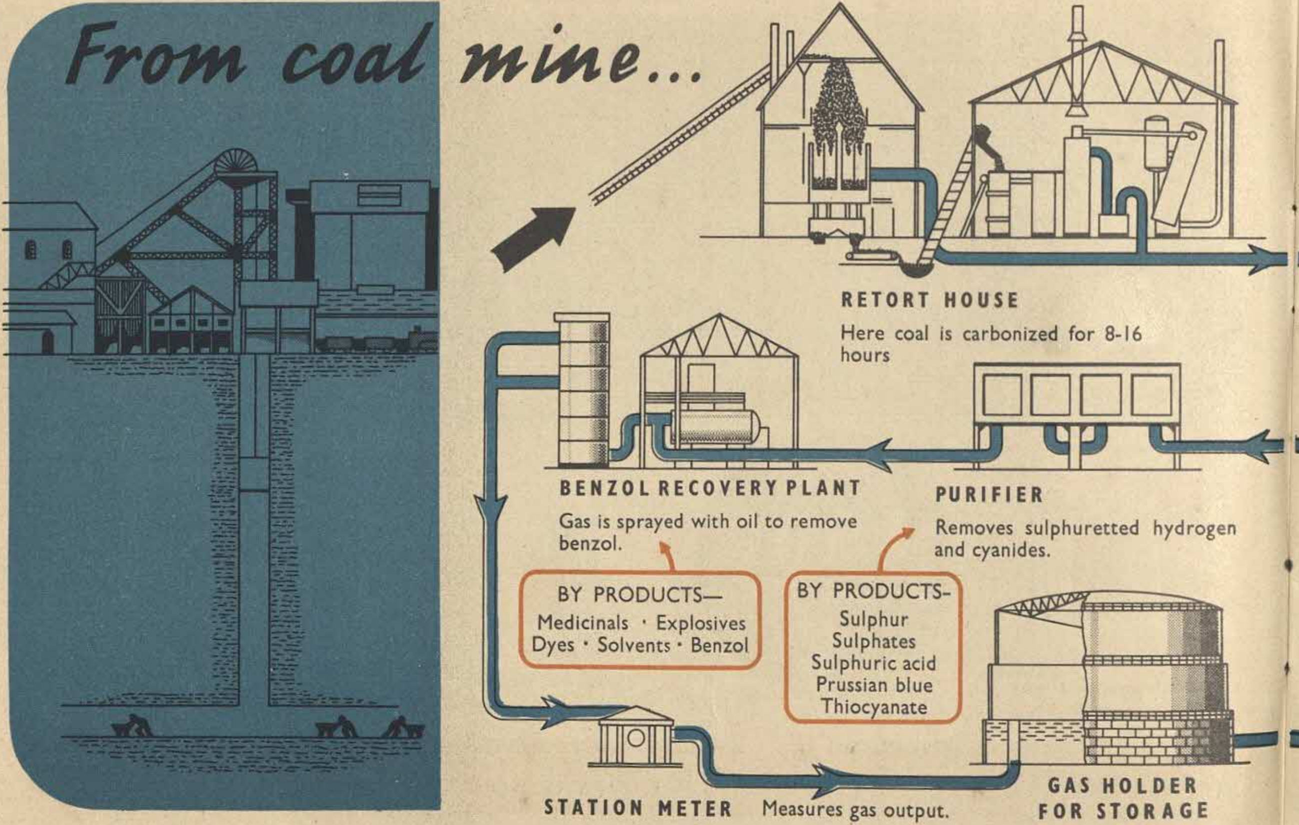
2,500 useful heat units

d in addition-

FERTILIZER	$\frac{1}{6}$ oz.
BENZOLE	$\frac{1}{5}$ oz.
TAR	$\frac{3}{5}$ oz.
USEFUL CHEMICALS	$\frac{1}{2}$ oz.

BRITISH GAS AND COKE OVEN INDUSTRIES USE OVER 40 MILLION TONS OF COAL PER YEAR

From coal mine...



RETORT HOUSE

Here coal is carbonized for 8-16 hours

PURIFIER

Removes sulphuretted hydrogen and cyanides.

BY PRODUCTS-
Sulphur
Sulphates
Sulphuric acid
Prussian blue
Thiocyanate

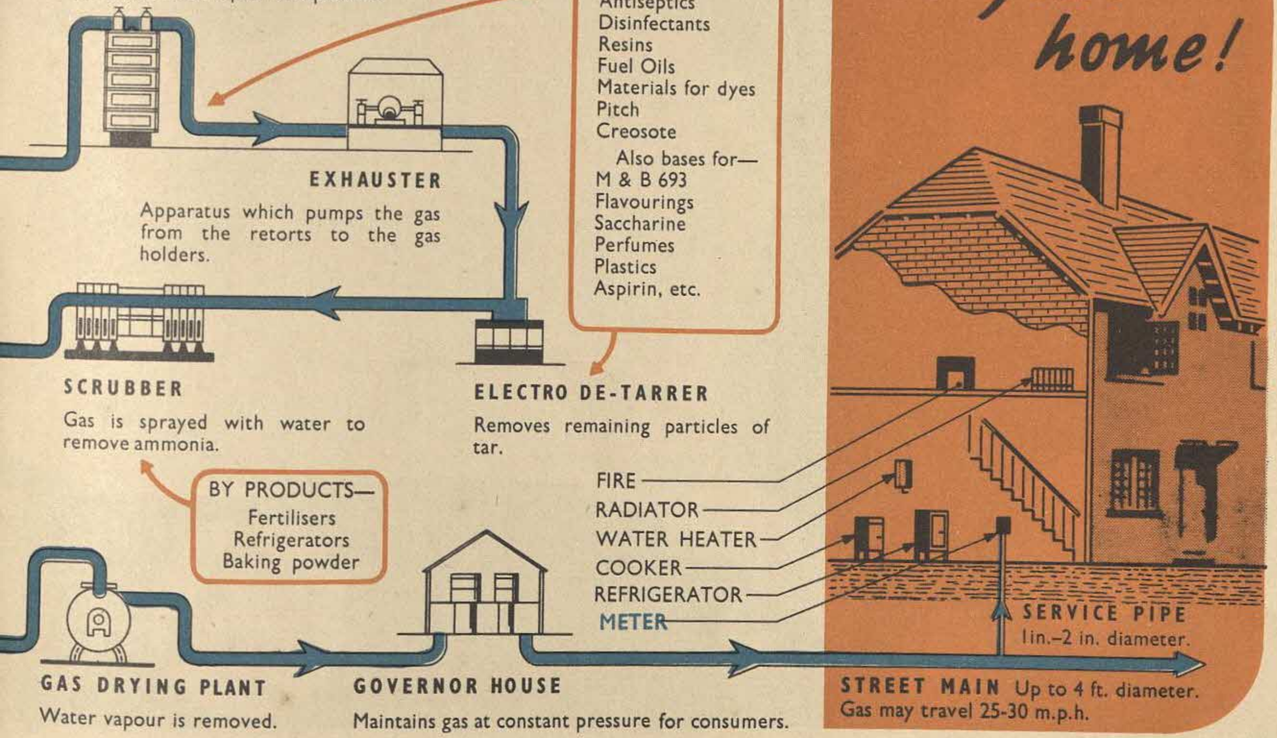
BENZOL RECOVERY PLANT

Gas is sprayed with oil to remove benzol.

BY PRODUCTS—
Medicinals · Explosives
Dyes · Solvents · Benzol

STATION METER Measures gas output.

GAS HOLDER FOR STORAGE



CONDENSER

Crude gas is cooled to atmospheric temperature and some tar and ammoniacal liquor is deposited.

EXHAUSTER

Apparatus which pumps the gas from the retorts to the gas holders.

BY PRODUCTS—
Naphthalene
Antiseptics
Disinfectants
Resins
Fuel Oils
Materials for dyes
Pitch
Creosote
Also bases for—
M & B 693
Flavourings
Saccharine
Perfumes
Plastics
Aspirin, etc.

SCRUBBER

Gas is sprayed with water to remove ammonia.

ELECTRO DE-TARRER

Removes remaining particles of tar.

BY PRODUCTS—
Fertilisers
Refrigerators
Baking powder

GAS DRYING PLANT

Water vapour is removed.

GOVERNOR HOUSE

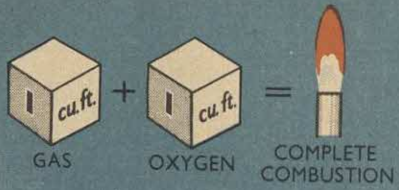
Maintains gas at constant pressure for consumers.

—to your home!

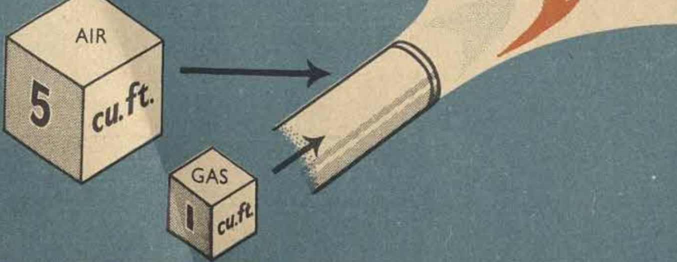
SERVICE PIPE 1in.–2 in. diameter.

STREET MAIN Up to 4 ft. diameter. Gas may travel 25-30 m.p.h.

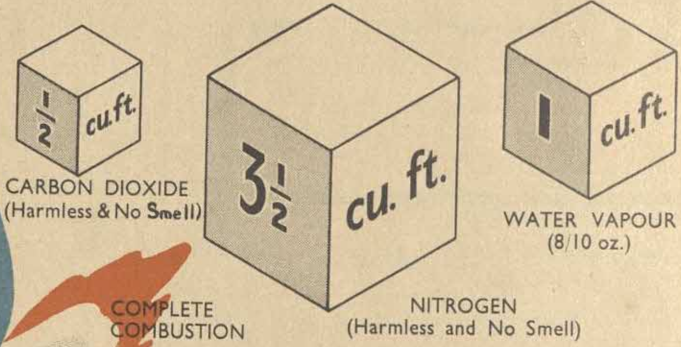
CHAPTER 2 · GAS IN YOUR HOME



For correct and complete burning (combustion) gas requires an equal amount of oxygen. Only 1/5 of the air is oxygen so that a quantity of gas requires five times that amount of air



When gas burns correctly the products are—

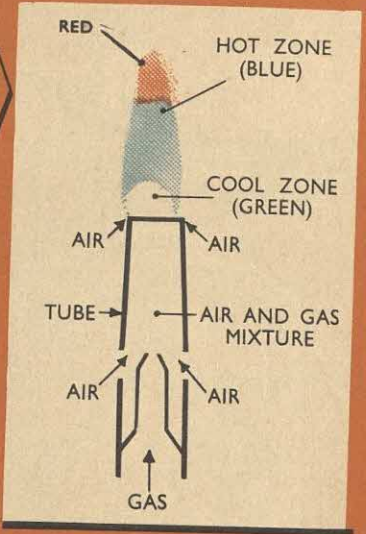


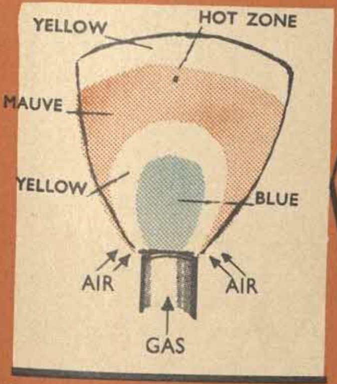
Gas is perfectly safe in normal use. Its distinctive smell enables any leak to be quickly detected.

GAS FLAMES can be of two types . . .

(1) AERATED OR "BUNSEN" FLAME

Used in most cookers, gas rings, and lights, where the flame touches the surface being heated. About half the amount of air required is drawn in through holes near the gas jet.



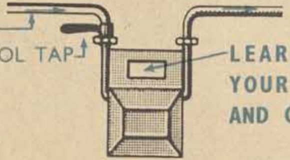


(2) LUMINOUS OR "NEAT"

Is simpler than the aerated type and is being used increasingly in radiators, hot water heaters, most modern fires and some ring burners. The gas burns in the air at the point of discharge from the burner and yellow part of flame is caused by tiny particles of carbon being burnt.

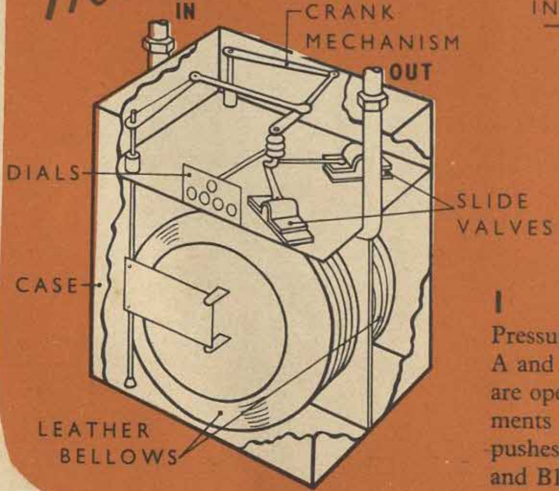
CHAPTER 3 · THE GAS METER

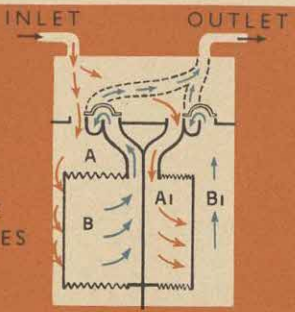
How it works



Turn off when you . . .
- Smell a leak
- Go on holiday

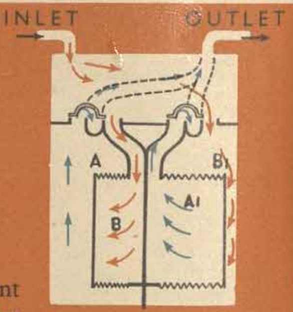
LEARN TO READ YOUR GAS METER AND CHECK WASTE





1

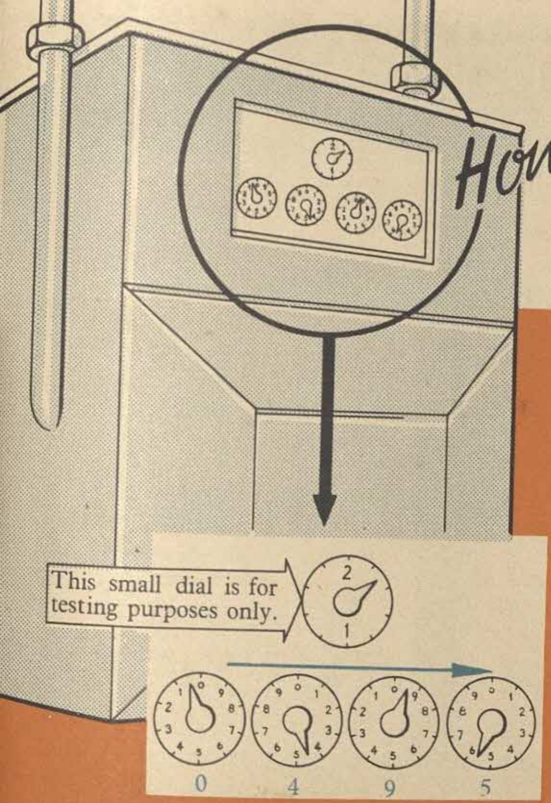
Pressure of gas entering A and A1 via valves which are operated by the movements of the bellows, pushes out gas from B and B1.



2

The movement of the bellows alters the position of the valves, so that gas is then pushed out of A and A1 by gas entering B and B1. The movement of the bellows is communicated to the dials by a crank mechanism and gearing.

How to read it


This small dial is for testing purposes only.
0
4
9
5

- Read dials from left to right.
- Write down smaller figure near the pointer (except when pointer is between 0 and 9, when the reading will be 9).
- The right hand pointer shows 100's of cubic feet, so the meter reading is 049500 cubic feet.
- See if you can read these examples:-

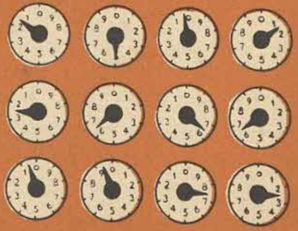
BY LAW

the meter must measure accurately to within 2% fast or 3% slow.

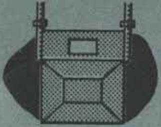
IF YOU SUSPECT

that the meter is not accurate the gas undertaking will test it (at your expense if found to be correct) and will adjust your bills if found to be incorrect.

FURTHER EXAMPLES

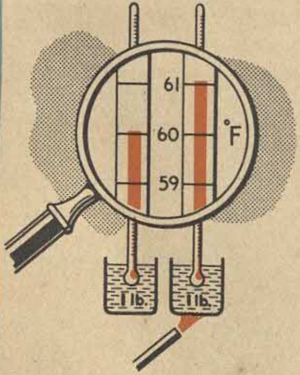


The answers will be found on p. 32



ALTHOUGH your meter measures the volume of gas used in CUBIC FEET you pay for it by the THERM—an amount of HEAT

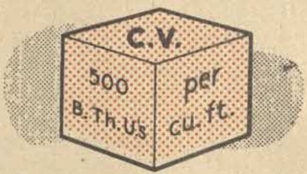
A THERM is 100,000 B.Th.U.'s (British Thermal Units)



One B.Th.U. is the amount of heat needed to raise the temperature of one lb. water one deg. Fahrenheit.

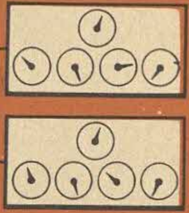
400 B.Th.U.'s

About 400 B.Th.U's are required to boil one pint of water. So, allowing for losses, one therm will provide enough heat to raise to boiling point about 250 pints of water.



To convert your meter reading of cubic feet to THERMS you need to know the heating power or the 'calorific value' (C.V.) of the gas. This varies in different districts, but it is usually about 500 B.Th.U.'s per cubic foot. So 1 cu. ft. would give $\frac{500}{100,000}$ or $\frac{1}{200}$ of a THERM Therefore each THERM would equal 200 cubic feet of gas.

HOW YOUR GAS BILL IS CALCULATED . . .

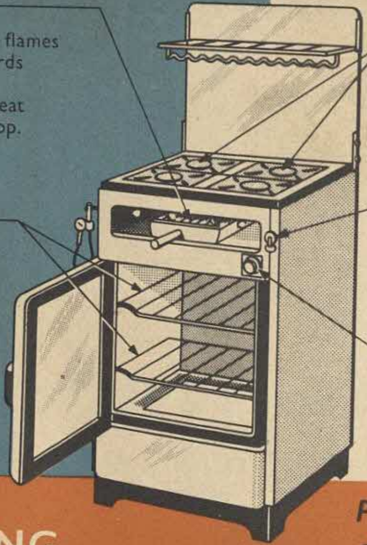


Example

- Meter reading - - - - - - - - 047500
- Previous reading subtracted - - - - (*say*) 041500
- Amount of gas used - - - - - - 006000 cu. ft.
- Multiply by the C.V. of the gas
  (say 500 B.Th.U.s per cu. ft.) - - - = 6000 × 500
  = 3,000,000 B.Th.Units
- To find number of therms divide
  by 100,000 (number of B.Th.Units in one therm) $= \frac{3,000,000}{100,000} =$ 30 therms used
- Multiply by price per therm (say 1/-) - - = 30 × 1/- = £1 10s. 0d.

- If you use a prepayment meter, for example 1/- or 1d. in the slot, this delivers a certain volume of gas for coin inserted. The difference between the setting of the meter and the current price of gas is allowed for.

CHAPTER 4 COOKERS



GRILL

Heat from bunsen flames reflected downwards from metal frets. Small amount of heat also available on top.

ADJUSTABLE SHELVES

OVEN

Row of burners at sides or along back, usually thermostatically controlled.

BOILING RINGS

Give direct heating, usually bunsen flames.

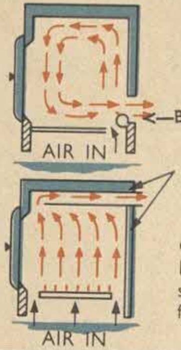
OVEN TAP

Always safety type. Turn on tap, light gas and leave full on. Set thermostat to correct reading.

THERMOSTAT

Controls oven heat automatically.

AIR CIRCULATION IN OVEN



Oven with burners along back, and back outlet.

Oven with burners along side, and top flue outlet.

CLEANING

After use

- Wipe inside oven whilst still warm to prevent accumulation of grease.

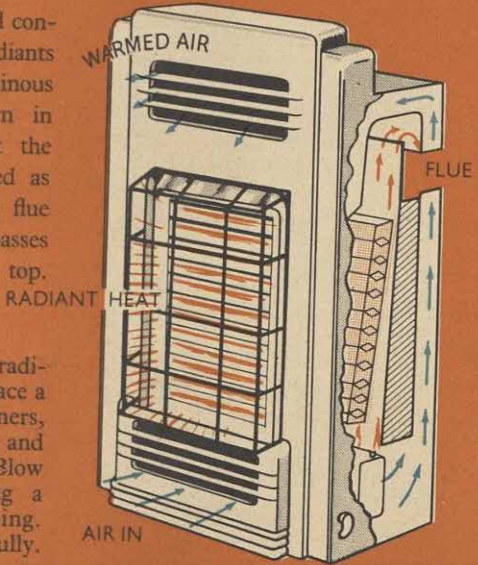
Periodically

- Wash bars and grill frets in hot soapy water and dry well.
- Brush burners and clear holes.
- Wipe over all enamel parts.
- Remove oven burners, brush and clear jet holes. Replace burners correctly.

GAS FIRES

CONVECTOR TYPE . . .

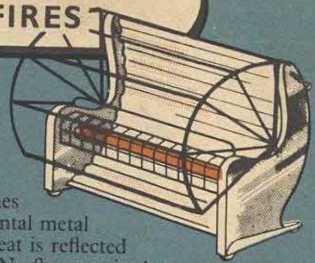
Heats by radiation and convection. Fireclay radiants are heated by luminous flames. Air is drawn in through the grill at the bottom and is warmed as it passes alongside the flue channel. It then passes out of the grill at the top.



CLEANING

Every year remove the radiants very carefully. Place a duster over the burners, and brush the fireback and under the canopy. Blow through burners using a piece of rubber tubing. Replace radiants carefully.

PORTABLE GAS FIRES



REFLECTOR FIRE

Row of flames heats horizontal metal radiant. Heat is reflected outwards. No flue required.

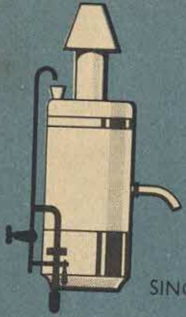
BOWL FIRE

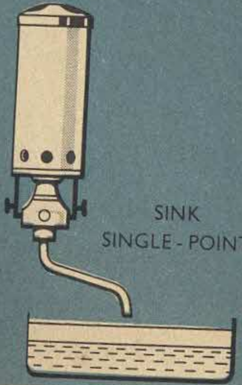
Flames heat a metal radiant. Bowl-shaped reflector concentrates the radiation into a beam like the headlamp of a car.

NEVER throw matchsticks, cigarettes ends or ash into the radiants.

CHAPTER 6

HOT WATER

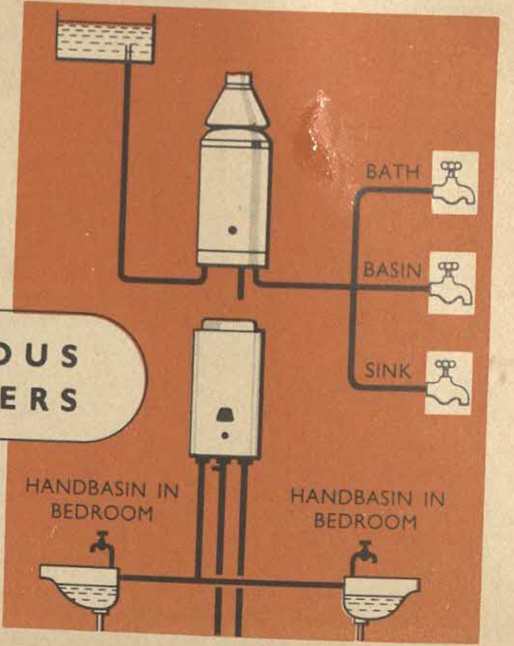




The water heating arrangements in your home should be designed to give you :

- Piping hot water on tap when required.
- Plenty of it for baths, washing, etc.

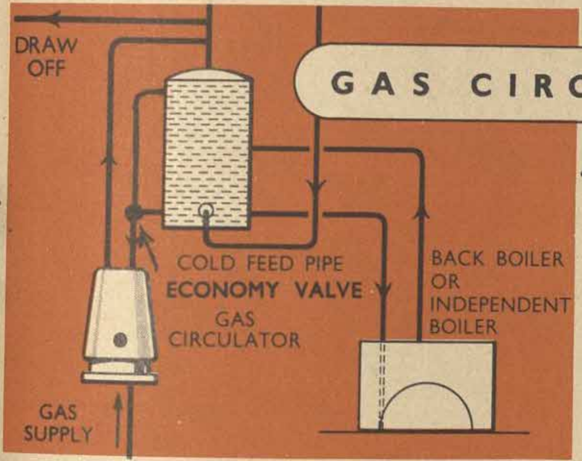
This can be achieved in various ways.



1

INSTANTANEOUS WATER HEATERS

Suitable sizes are available for fixing over the sink, basin or bath, and will provide adequate and continuous supplies of hot water. Some heaters will produce boiling water.



2

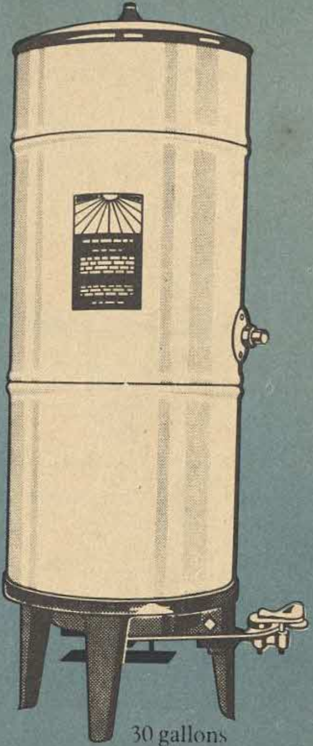
GAS CIRCULATOR

- A thermostatically controlled appliance which heats water for storage in an external storage tank. It can also be used in conjunction with a solid fuel boiler for water heating in summer. An economy valve may be used to reduce quantity of water heated until large amounts are wanted.

3

GAS STORAGE HEATER

A similar appliance to the gas circulator except that it includes its own lagged storage cylinder and is thus a self-contained unit. Small models of about 2 gallons capacity are available for use at the sink only.

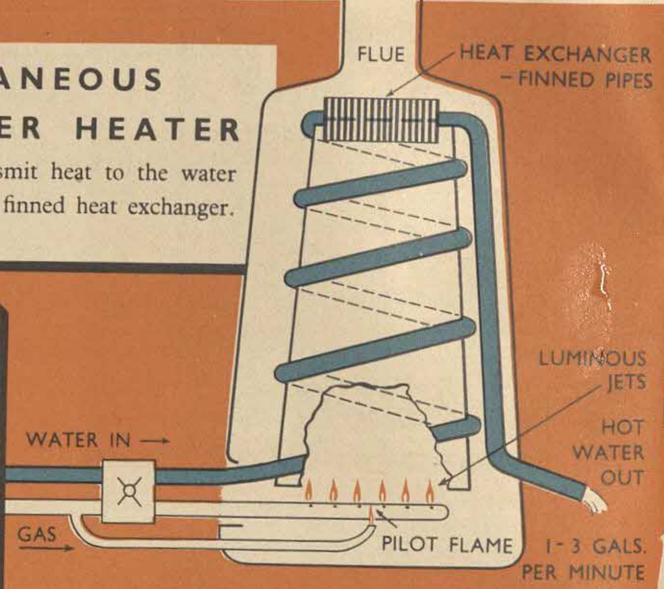


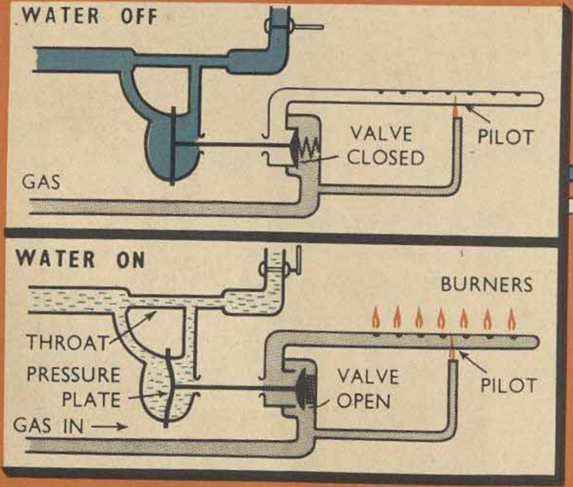
30 gallons capacity

HOW WATER HEATERS WORK

INSTANTANEOUS WATER HEATER

Hot flue gases transmit heat to the water passing through the finned heat exchanger.





Gas cannot pass to the main burners unless water is flowing through the appliance. When the water is turned on, the difference in pressure on each side of the pressure plate opens the valve and allows gas to flow to the burners, where the pilot flame ignites it.

STORAGE HEATERS & CIRCULATORS

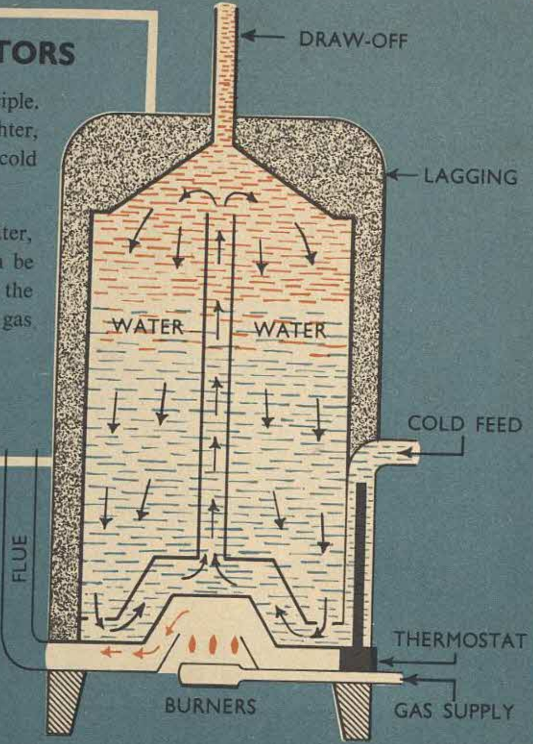
Both storage heaters and circulators work on the same principle. As the water is heated, it expands and therefore becomes lighter, and is displaced to the top of the storage cylinder by the cold water.

The hot water, being lighter, does not mix with the cold water, and consequently small quantities for washing up, etc., can be drawn off soon after the appliance has been lit. When the cylinder is full of hot water, the thermostat reduces the gas supply, allowing only sufficient to keep the water hot.

CARE AND MAINTENANCE

Never tamper with a water heater, it is carefully adjusted to give hot water at the right temperature. If anything goes wrong, consult your gas undertaking.

Keep the outside clean and make sure that flues (where existing) are quite clear and not blocked by birds' nests or accumulations of dirt !



CHAPTER 7 REFRIGERATION

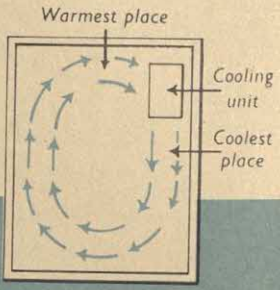
KEEP FINS CLEAN AND UNCOVERED
KEEP CLEAN INSIDE AND OUT

Food spoils because micro-organisms always present are continually increasing, especially in warm weather. For example, in 48 hours :

Bacteria at 68° F. multiply 360,000 times.
in Milk at 50° F. multiply only 6 times.

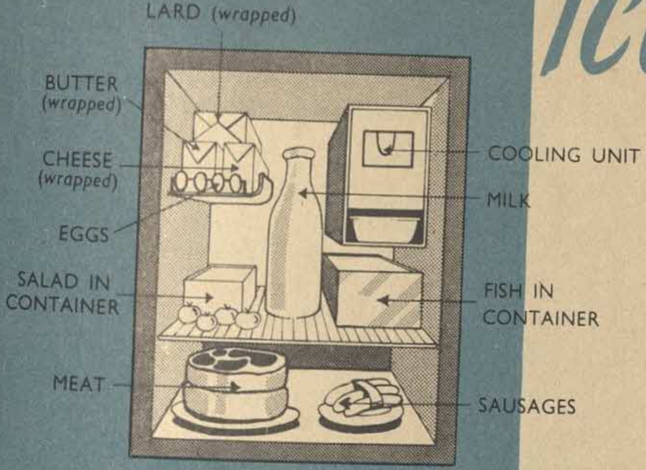
At about 45 F.° most foodstuffs will keep fresh for several days. There is no need for actual freezing (32° F.) although the colder the food is, the longer it will keep.

The Gas Refrigerator has no moving parts but is operated by a small gas flame. The temperature inside the cabinet is controlled by a thermostat.



COOL AIR CIRCULATION INSIDE REFRIGERATOR

- KEEP DOOR CLOSED AS MUCH AS POSSIBLE
- NEVER PUT **WARM** FOOD IN



CORRECT PLACING
OF DIFFERENT FOODS
IN REFRIGERATOR

ICE

When ice accumulates on the cooling unit, although it looks very cold, it forms an insulating layer over the unit which should then be " de-frosted " as follows :

1. Turn thermostat to " O." or turn off according to maker's instructions. Open the door and leave it open.
2. Remove food and ice trays.
3. Allow ice or frost to melt from cooling unit.
4. Wash inside cabinet with warm soapy water or weak soda solution. Dry thoroughly.
5. Dry the cooling unit and the bottoms of the ice trays. Three-quarter fill the trays with water and replace them.
6. Replace food, relight gas or reset themostat to usual number and close door.

REMEMBER that the kitchen is often warmer in winter than in summer because of lack of ventilation.

ALWAYS leave the gas on when the refrigerator is in use and don't turn it on and off unnecessarily.

NEVER leave food in the refrigerator when the gas is off.

HOW A GAS REFR

REFRIGERATION is based on the fact that when a liquid evaporates it takes heat from its surroundings. For example, a drop of Eau de Cologne or methylated spirits on your hand evaporates very quickly and makes your hand feel cool.

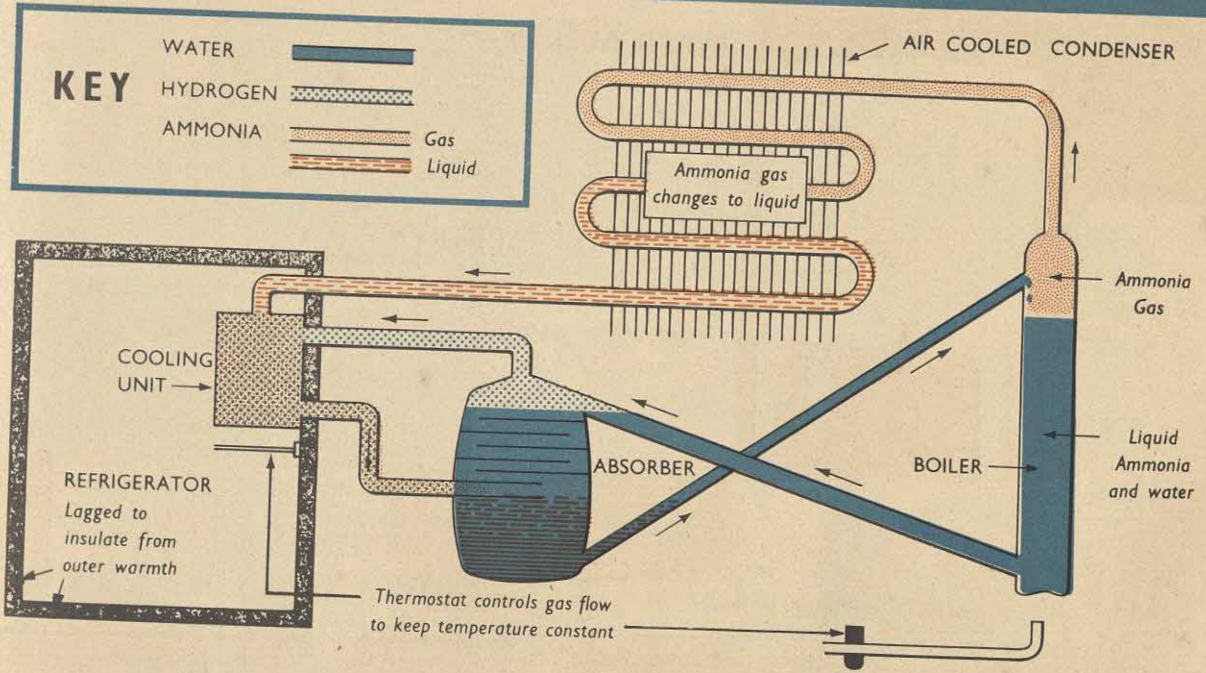
The evaporating liquid (or refrigerant) used in a gas refrigerator is usually ammonia, and this is sealed in the system under pressure. Water and hydrogen are also introduced into certain parts of the system to provide " buffer " and " absorber " circuits.

A small gas flame is used to heat the liquid and cause the liquids and gases to circulate, and the flame being controlled by a thermostat inside the refrigerator cabinet.

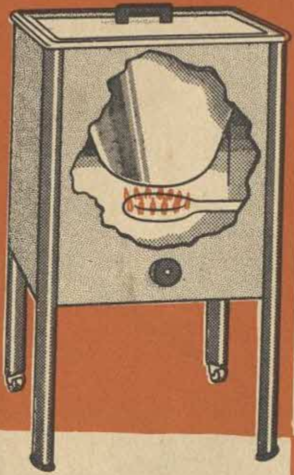
- The gas burner heats the mixture of liquid ammonia and water in the boiler, and ammonia gas is driven off. This passes to the condenser, where the gas is cooled and changes back to liquid.
- The liquid ammonia trickles into the cooling unit where, in the presence of hydrogen, it evaporates into a gas again, taking heat from the unit and hence from the cabinet.
- The mixture of the two gases falls to the bottom of the cooling unit and into the absorber, where the ammonia gas is absorbed by the water. The hydrogen, which will not dissolve in water, rises up and passes back to the top of the cooling unit.
- The ammonia solution flows from the absorber to the boiler and the process is repeated continuously.

SIMPLIFIED DIAGRAM OF PRINCIPLE OF GAS REFRIGERATOR

IGERATOR WORKS



CHAPTER 8 · MISCELLANEOUS



WASH BOILER

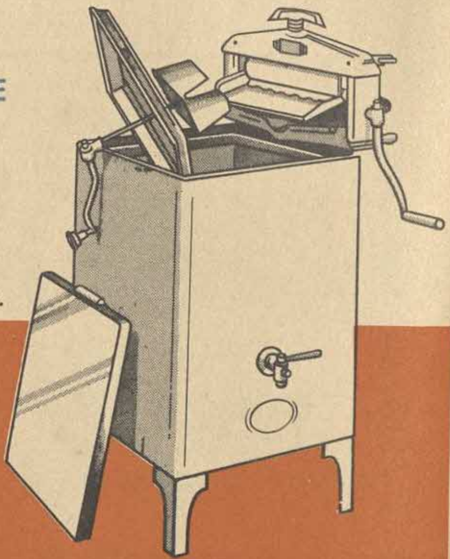
A ring burner heats the water in a dome-shaped boiler.

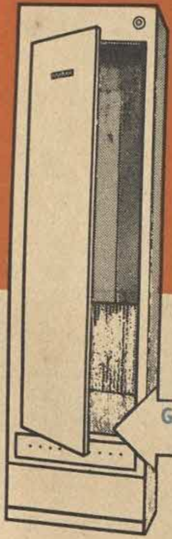
A flue is not essential for the smaller sizes

GAS HEATED WASHING MACHINE

This is a gas heated wash boiler with an electrically driven or hand-operated agitator. It has a hand or power-operated wringer.

After use, see that the rollers and agitator are clean and dry. Wash out boiler with clean water and dry thoroughly after use.



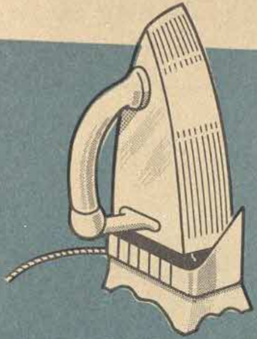


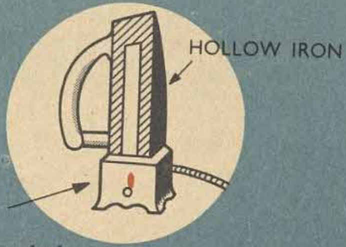
GAS DRYING AND AIRING CUPBOARD

Adjustment is not necessary, and any trouble should be reported to your gas authority.

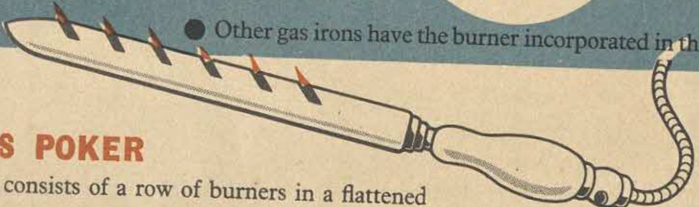
GAS IRONS

A modern gas ironing set consists of two irons and a small heater. One iron is heated whilst the other is in use.





- Other gas irons have the burner incorporated in the unit.



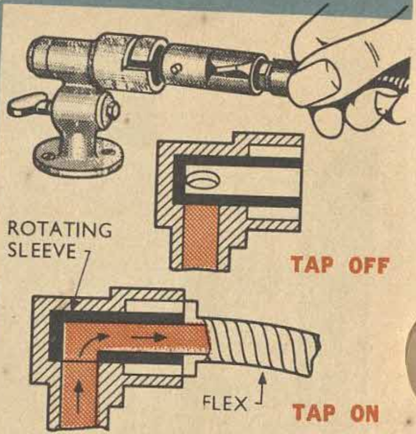
GAS POKER

This consists of a row of burners in a flattened tube.

Do not leave the poker in the fire when it is well alight.

Keep the burners free from ash and d

BAYONET CONNECTOR

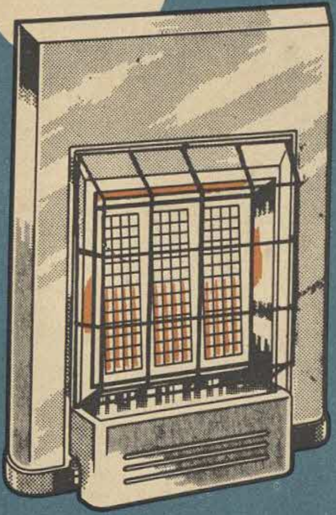


This is one type of fitting which provides a gas point to which portable fires, etc., can be instantly connected.

As the plug is inserted into the socket and turned the gas is turned on and can be regulated either by a tap on the connector or on the appliance. When the plug is withdrawn the gas supply is turned off

CHAPTER 9 · ECONOMY HINTS

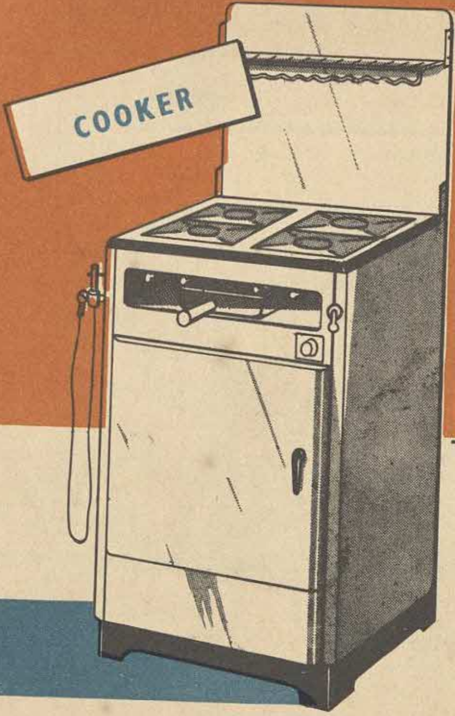
FIRE



- Turn fire down as soon as the room is warm.
- Turn fire out when room is left empty.
- To keep the jets clean, carefully remove radiants and blow out fluff and dust.
- Always renew broken radiants.

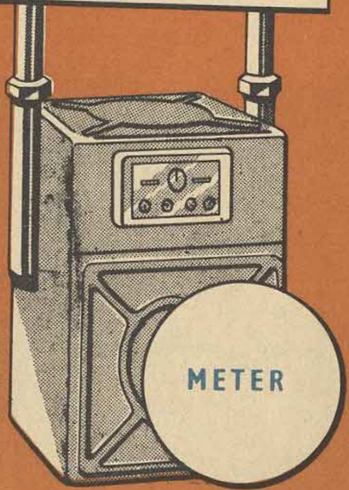
KETTLE or PAN

- Heat only the quantity of water required.
- Use the water as soon as it boils.
- Flames should not spread up the side of the vessel.
- Put a lid on the pan.
- Use a small burner when possible.
- Keep the holes in the burner clear.
AERATED FLAMES SHOULD BURN STEADILY AND HAVE CLEARLY DEFINED INNER CONES (as shown on page 9).



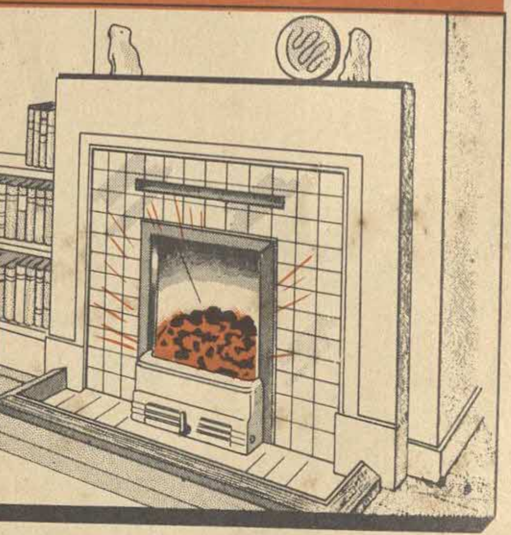
- Use the oven to capacity — cook something for tomorrow.
- Keep jets clean and remove all grease from the bars.
- When using the grill, don't waste the heat that rises use it to warm washing-up water.

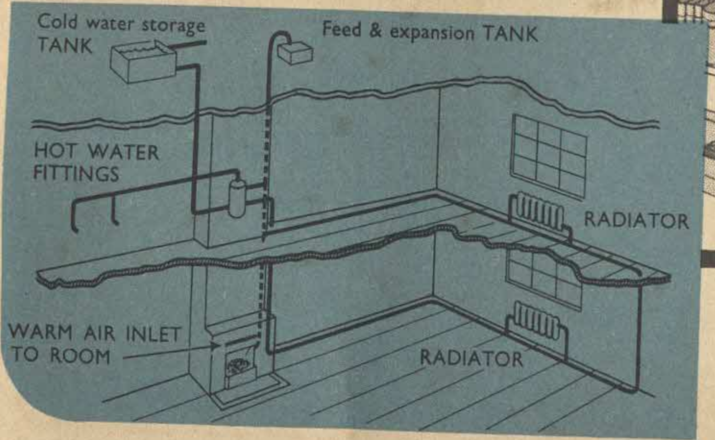
- Check your consumption every week as explained on page 11



CHAPTER 9 · GAS-IGNITED COKE FIRES

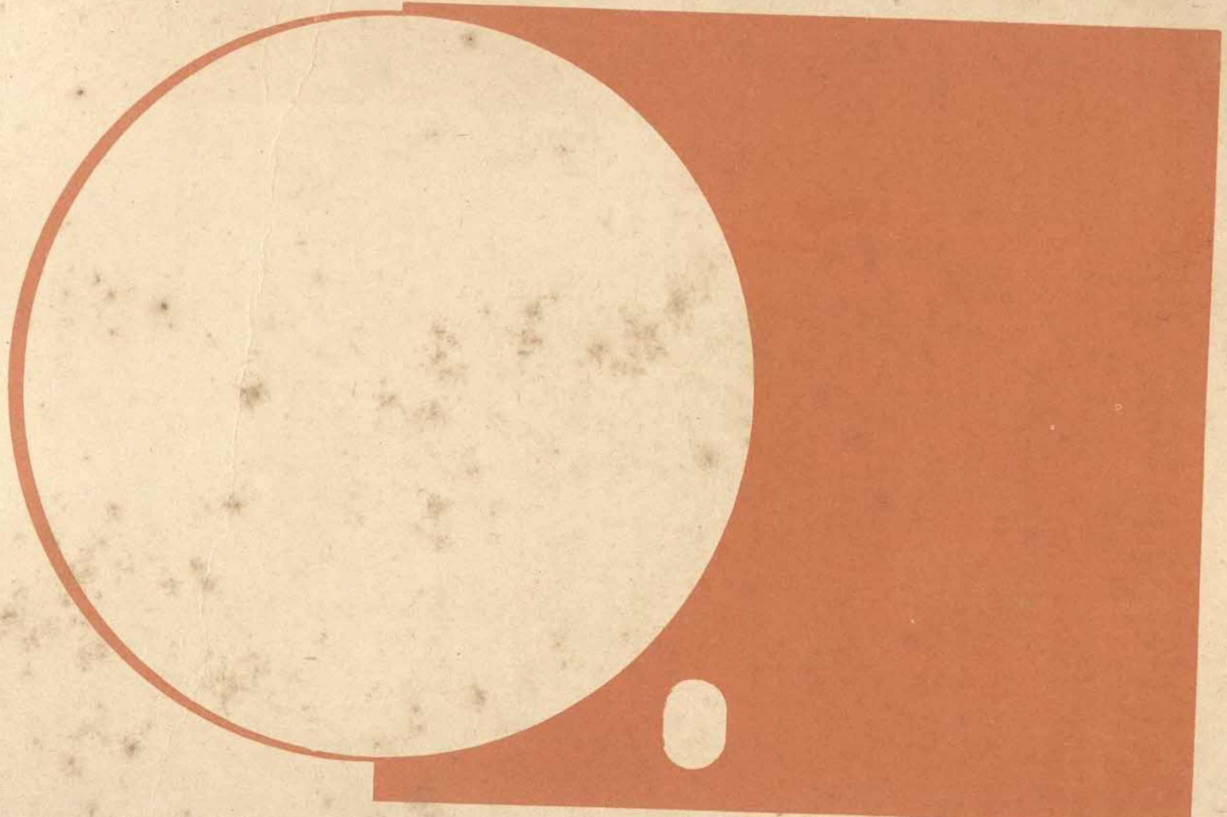
The modern open fire, burning solid smokeless fuel,★ has almost twice the efficiency of the usual open coal fire. If necessary ordinary house coal or wood can be used. A fire-back boiler can be provided to supply hot water and also a radiator system to give additional heating throughout the house. To provide for easy lighting, gas ignition burners are usually fitted.





★ Solid smokeless fuel—Anthracite and Dry Steam Coal (which are mined), Coke (product of the gasworks) and Carbonised Ovoids (manufactured from coal).

Answers to problems on page 11 : 1501, 2666, 0972



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